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Electric Vacuum Cleaners

Their Selection, Use, and Care

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Electric Vacuum Cleaners

Their Selection, Use, and Care

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Selection of the Vacuum Cleaner

The following points should be considered in the selection of a vacuum cleaner:

What's to Be Learned First of All?

Reliability of Manufacturer and Dealer.—It is best to choose a vacuum cleaner manufactured and sold by a firm which is known to be reliable and which has been in business long enough to have established a reputation for quality merchandise and continued service. The retail dealer should be one who is able to give service and replace parts without delay.

Guarantee and Service.—Upon the reliability of the dealer and the manufacturer depends the real worth of any guarantee. It is advisable to determine what service is really available in accordance with this guarantee. Most manufacturers guarantee the vacuum cleaner against defective workmanship or material for a period of one year. Others extend the guarantee period for two or more years.

The belt and brush on the motor driven brush type cleaner are subjected to constant wear when the cleaner is in use, and may wear out or need repair during the guarantee period. Many companies specify that the belt and brush (and light, if present on the cleaner) are not included in the conditions of the guarantee. The guarantee usually does not cover damages occasioned through accident, neglect, or abuse on the part of the user.

Some companies agree to rebuild the cleaner for a specified sum any time after the guarantee period has expired. This amount includes all labor and costs of parts necessary to put the cleaner back into good condition. In such instances if the manufacturer is a reliable one, the cleaner will be practically as good as when it was new.

*The Financing of the Purchase.**—The lead pencil is an important tool in household operation; the purchase of equipment is one of the places to use it. Equipment may be purchased in any one of several ways. The simplest and in many ways the most satisfactory method is to pay cash—if possible without borrowing. If one does pay cash, try to get "discount for cash." If one does not have the cash, one of the following methods of obtaining a loan may be used:

* Prepared by B. A. Wallace, Extension Economist in Marketing, Ohio State University.

1. The dealer may furnish the credit.

   (a) On open account. He may charge interest or may not. Oddly enough, some dealers let one pay for the goods 3 months or 6 months later at no higher charge than if the deal were for cash.

   (b) On installment. One pays part in cash, the balance at so much a month. If paid in only 3 monthly installments, sometimes no interest charge is made.

   The Federal Housing Administration in the spring of 1937 discontinued its loans on household equipment. In some cities, the buyer can still make a similar arrangement with the dealer but usually at 6 or 7 per cent. The borrower of $100 at 6 per cent on this plan is paying $6 per year of interest on each $100 in spite of the fact that each month he is cutting off one-twelfth of the debt.

2. To get the cash, one may have to borrow.

   (a) He may borrow from a commercial bank at 6 or 7 per cent; the bank generally does not require monthly payments. Most banks follow the practice of subtracting each payment as made, thus reducing the amount on which the borrower is paying interest. An 8 per cent rate on this plan is lower than 6 per cent or even 5 per cent on the usual finance plan. Ask your dealer or banker which plan of figuring interest is offered.

   (b) The farmer may borrow on his Production Credit Association at 5 per cent per year, plus costs of placing the loan, on the security of a mortgage on livestock or machinery. This mortgage does not touch auto or household goods.

   (c) The private finance or chattel loan company lends on chattel mortgage security, often including household goods and auto, at rates from 12 to 36 per cent per year. These loans are generally payable in monthly installments utterly unsuited to most farm incomes. Some companies lend without chattel mortgage security, but require two co-signers on the note.

Safety.—It is advisable that the vacuum cleaner selected be listed as having been approved by the National Board of Fire Underwriters. Products so listed are not necessarily the same in quality; such listing, however, indicates compliance with the Underwriters' Laboratories' minimum requirements for safety.

The *cord* should be of standard quality and approved by the National Board of Fire Underwriters. A label on the cord shows such approval. Wherever the cord or wires come through an opening in the metal part of the cleaner, the sharp edges of the opening should be covered with a rubber or composition bushing in order to protect the insulation covering the conductors.

How Much Will It Cost?

Initial Cost.—The initial cost of vacuum cleaners varies from about $20 to about $85, exclusive of attachments or other separate cleaning tools. Prices vary according to sizes and types, size of motor, and special convenience features such as lights, automatic nozzle height adjustor, handle adjustment, special cord holders or carriers, and many others. Usually the straight suction cleaners of the supported nozzle types are the least expensive.

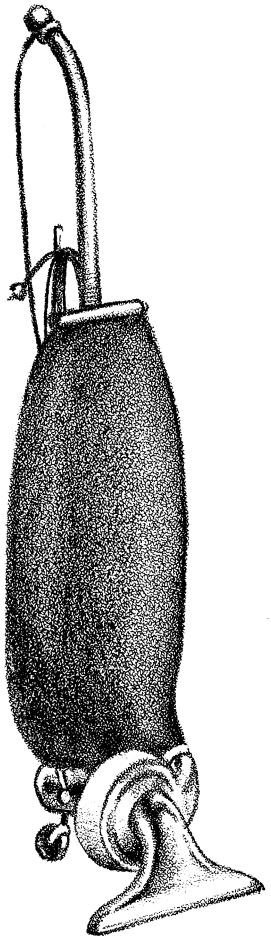

Fig. 1. — Straight suction cleaner with partially supported nozzle.

Cost of Operation.—The cost of operation of vacuum cleaners is about the same for each of the various types. Most vacuum cleaners use around 300 watts ($\frac{1}{3}$ kilowatt hour) per hour of use. There are some, however, which have a higher wattage rating of around 600.

What Are the Types of Vacuum Cleaners?

All vacuum cleaners operate on the basic principle of suction. When the motor is in operation, a partial vacuum is created in the center of the fan. (The fan is connected to the motor shaft.) Because of this lower pressure on the inside, air from outside the cleaner rushes in. Usually the only place for it to enter is through the nozzle opening. With the air comes the dirt, which is in the path of the air stream on the surface or slightly below the surface of the rug pile. The dirt is later filtered from the air and left in the bag or dirt container. The air passes on through the bag and then back into the room.

Vacuum cleaners may be classified into two general groups, according to structural features which produce the cleaning action. One is known as the straight suction type; this type may be had with a partially or wholly supported nozzle (see Fig. 1) or an unsupported nozzle (see Fig. 2). The other type of cleaner is that with the motor-driven brush (see Fig. 3).

The Straight Suction Cleaner.—This type depends upon the nozzle lips (and stationary brush if there is one) to sweep, brush, or scrape the pile. The dirt thus removed, as well as surface litter, is then pulled up by suction into the dirt container. Since cleaning with this type cleaner depends almost entirely on suction, it is very necessary to have a high degree of suction in order to remove dirt from the floor covering. In order to help bring this about, the nozzle is made purposely small, because the smaller the nozzle

opening the greater the suction will be. In some, the suction is increased by increasing the power of the motor. Partially or wholly supported nozzle cleaners of the straight suction type often have stationary or floating brushes to help in the cleaning action by brushing the pile and removing thread and lint. Such cleaners equipped with floating brushes seem to be easier to push.

Cleaners of the unsupported nozzle type (Fig. 2) seem to require more skill and attention during cleaning than do those with other types of support. In order to produce a perfect nozzle seal which is so necessary for efficient dirt removal, the nozzle always must be held correctly against the floor covering. With the use of the unsupported nozzle type cleaner it is easier to change back and forth from rug cleaning to furniture and drapery cleaning than with those of other types of support.

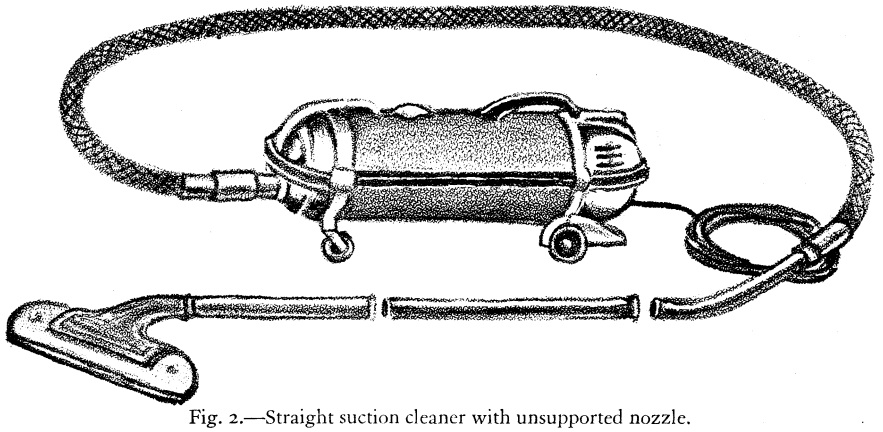

Fig. 2.—Straight suction cleaner with unsupported nozzle.

Motor-driven Brush Cleaner.—Most cleaners of this type have partially or wholly supported nozzles.

Motor-driven brush type cleaners have the same action as straight suction cleaners, with the addition of a beating or agitating action. This rug agitation is produced by a revolving brush roll, which helps to dislodge embedded dirt. Cleaners having the nozzle supported by wheels will produce greater vibration than those which are only partially supported. This is possible because the rug can more easily be lifted up and away from the floor. If the nozzle is not well supported, it rests on the rug and thus tends to hold the rug against the floor. Usually, cleaners which have motor-driven brushes have a comparatively larger nozzle opening than straight suction cleaners. Some suction or lifting power is usually sacrificed in cleaners of this type in order to make the beating action possible.

What Cost for Maintenance?

Nothing definite can be said regarding the cost of servicing a vacuum cleaner. Any machine is likely to require service or repairs several times during the normal lifetime of the appliance. It is a good practice to have

the vacuum cleaner checked and examined by a competent service man once every few years. Such checking service, if there are no replacement parts needed, usually costs around $2.00.

If strings, threads, or hair are allowed to collect and remain wound around the brush roll on motor-driven brush type cleaners, or if the cleaner is used with the nozzle too close to the rug, undue strain is put on the motor. Such overheating of the motor may in time cause the motor windings to be burned out and make it necessary to have the motor rewound or replaced. Also, under such conditions, much strain is put on the belt and may result in the belt breaking or deteriorating in such a way that it is too loose and may not turn the brush roll. When this occurs, the cleaning efficiency is greatly lowered.

Pins, hairpins, and all such sharp objects should not be picked up by vacuum cleaners which have the fan blade in the path of the air-dirt stream. As these objects are drawn through the nozzle and hit the fan blades on their way to the bag, they may bend, crack, or dent the fan. If the fan is damaged, maximum suction cannot be secured, and in order to restore good cleaning ability, the fan may have to be serviced or replaced.

On many cleaners, hooks over which to wind the cord are provided. If the cord is pulled too tightly around these hooks, undue strain is put on the insulation and the conductors, which may necessitate having a new cord put on the appliance. In some kinds of construction this means an expense of several dollars.

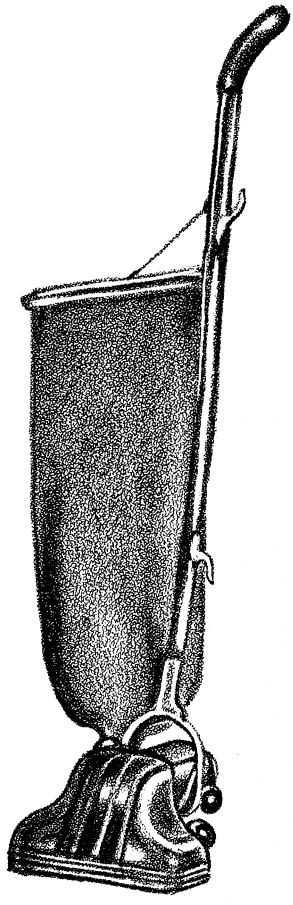

Fig. 3. — Motor-driven brush cleaner with wholly supported nozzle.

After the motor-driven brush type vacuum cleaner has been used for a few years, the brushes wear down. In order to restore maximum cleaning efficiency, new brushes will have to be inserted in the brush roll if it is possible; otherwise a new brush roll will have to be bought.

How Is the Dirt Collected?

Brush Roll.—The brush roll should be easy to remove and replace, and adjustable as to position in the nozzle opening. As the brushes wear down there should be some provision for lowering the brush roll so that the tips of the bristles always extend a little below the nozzle lips, thus making good contact between the brush bristles and the floor covering. It would be

advisable to note the number of these adjustments and the ease with which changes can be made.

The bristles on the roll separate the pile of the rug so that the air stream can reach the dirt below the pile surface. They also agitate the rug when they are in contact with it. As the suction created by the fan pulls the rug up to the nozzle and forms a seal between the rug and nozzle lips, the brush comes along and pushes the rug down and away from the nozzle, but not enough to break the seal. This lifting up and pushing down action causes agitation of the rug. The stiffer and more dense the bristles the greater the vibration will be. Bristles should not be so stiff, however, that they cause rug wear.

Some brush rolls are made with the row (or rows) of bristles going straight across the roll. However, better cleaning is usually possible if the row (or rows) of bristles run diagonally across the roll. It is desirable to have the bristles so placed on the brush roll that they can be removed for replacement. If the roll is comparatively small in diameter, threads and hair are much more apt to collect around the brush roll, thus hampering the turning of the roll. This is because such materials wind around the roll in between and over the bristle tufts instead of being thrown up into the bag.

Cleaners of the straight suction type often have stationary brushes placed either in front of or behind the nozzle. Since the bristles are for the purpose of sweeping the rug and picking up threads and lint, these should be fairly stiff.

Some additional vibration or agitation is secured when strips of metal or rubber are incorporated on the brush roll in addition to the bristles. This makes for greater agitation of the rug and at the same time does not seem to harm the rug pile because the surfaces of the strips are smooth.

Dust Bag or Dirt Containers.—If the vacuum cleaner has a dust bag, it is essential that the cloth from which the bag is made does not leak dust. This is usually made possible by close weaving such as is produced by the twill weave. The bag is for the purpose of filtering the dirt from the air — the dirt remaining on the inside and the air passing on out through the pores of the bag cloth. The more air which passes through the cleaner the greater the cleaning ability. Therefore, anything which interferes with this flow, such as size of bag, material of bag, dirt accumulation in the bag, or dirty bag cloth lowers the cleaning efficiency of the appliance.

Relatively small bags must be emptied much more often than larger ones. Some are so small that it may be necessary to empty them during the course of general cleaning. Bag cloths with a rough or hairy interior surface are likely to catch and hold particles of dust and lint, thus the efficiency of the cleaner will be greatly lowered. Bag cloth used by some manufacturers is chemically treated so that its dust leakage will be lowered to some extent. Bags made from cloth so treated should not be washed or dry cleaned.

The bag should be easy and convenient to remove and replace, and if supported by the handle of the vacuum cleaner should be in such a position

that it will interfere with the user as little as possible. Bags placed to the right of the handle seem to be in the most convenient position for the right-handed person. If the bag is directly behind the handle it is usually more difficult to get under low furniture with the cleaner, because the bag when inflated, as it is during operation, takes up a considerable amount of space. With the bag in the latter position, however, more even balance between the various parts of the cleaner can be secured than if the bag is at the side, especially if there is an accumulation of dirt in it. If there is good balance between these parts the cleaner is easier to push, and it is easier to keep the nozzle in the correct relationship to the rug.

Some bags have an inner sleeve which acts as a valve, preventing the dirt from falling back into the fan chamber or on the floor when the bag is being removed for emptying. It is important to see that this inner sleeve is kept clean and free from surface litter which tends to collect between the sleeve and the outer bag. The connection between the bag and the fan chamber should be airtight, as well as that at the clip on the top of the bag. It is desirable that this clip be easy to remove and replace, and if made of metal be provided with securely fastened rubber guards to prevent it from marring furniture or catching on garments.

A metal band placed in the hem at the top of the bag facilitates emptying and cleaning. The bag is usually attached to the handle by means of a hook and eye. This hook device should be so constructed that the bag can be easily detached, and should be sturdy enough that it will support the bag and keep it off the floor when there is an accumulation of dirt in it.

Paper bags are being manufactured for use with some vacuum cleaners. Much experimentation is being done with regard to securing a more porous paper fabric, along with greater durability and less cost. Much of the trouble in the past has been due to the bag breaking prematurely, and also to the fact that the efficiency of any cleaner using a paper bag tends to be lowered. This inefficiency is often a result of the common practice of allowing the dirt to accumulate in the paper bag until both are ready to be discarded.

If the cleaner is equipped with a metal dirt container fastened directly onto the bag, the major portion of the accumulated dirt in the bag is removed by shaking the contents down into the metal container. Such a device facilitates emptying the bag, but does not eliminate the necessity for giving the bag a thorough cleaning once in a while. (The bag on every vacuum cleaner after it is emptied should be turned wrong side out and brushed with a whisk broom at least once a month.)

How Is the Handle Made?

Handle.—The handle on cleaners of the types which have the nozzle partially or wholly supported by wheels should have an insulated handle grip which is comfortable to hold. The handle should be of such a length that the user is able to stand in a comfortable position (without stooping) while using the cleaner.

For convenience in use, it is desirable that the cleaner be equipped with a handle adjustment device which will keep the handle in any position desired. The positions usually provided are: (1) the vertical position, (2) the position for normal use, and (3) that position which will lower the handle parallel to the floor level so that the cleaner may be used under low furniture. Without such handle control it might be impossible to clean under furniture without breaking the nozzle seal, thus decreasing cleaning ability.

The adjustments for each of these positions should be positive. For example, when the handle is in the vertical position, it should remain there until further adjustment is made. The adjustment for the upper limit of the normal use range will be that which approximates the vertical position. The adjustment for the lower limit of the normal use range should hold the handle high enough off the floor so that it can be grasped readily without much stooping. With the handle in this position, it is then possible to tilt the nozzle of the cleaner so that the cleaner can be moved easily over bare floors or door sills or carpet fringe. There should be free movement of the handle of cleaner between these two limits if the greatest convenience in use is to be had.

The adjustment control for these various positions should be easy to operate and conveniently placed. The cleaner should be in good balance when the handle is in any one of these positions.

The nozzle on electric cleaners of the unsupported nozzle type is connected to a rigid tubing which is made into sections to facilitate storage. This rigid tubing is connected to a flexible tubing; this, in turn, is connected to the part which houses the dirt container and motor. The rigid tubing thus serves as a handle. Therefore, it should be of such a length and shape that the operator can move the nozzle back and forth over the rug without much stooping and without breaking the seal at the nozzle. Connections and couplings on this type cleaner should be so made that they stay tight, yet are easy to connect and disconnect.

Switch Control.—The switch control is usually placed on the handle of cleaners of the supported nozzle type. The most convenient location for the switch is that one which is just below the handle grip.

The switch control on cleaners of the unsupported nozzle type is placed somewhere on the housing near the motor. The switch control should be of such construction that, if desired, it can be pushed on and off by pressing it with the foot, or so that it is unnecessary for the operator to stoop to turn the motor on and off.

Cord.—A rubber covered cord is easier to clean, and is much less subject to kinking and wear than one with a cotton braided covering. The cord should be quite flexible, in order to prevent knotting, kinking, and excessive wear.

On cleaners in which the cord or wires may be cut or caught by the handle bail when the position of the handle is being changed, there should be some protection on the cord or wires at this point. A metal spring-like stress relief should give such protection.

What About Rug Wear?

Nozzle height control is a device whereby the distance between the rug and the nozzle lips can be changed under varied conditions of carpet pile height. Such an adjustment is necessary in order to obtain the most effective relationship between nozzle and rug as a result of which the best cleaning action will be secured. The control should be easy to operate, conveniently placed, and if not automatically controlled, labeled to show in which direction it should be turned to raise or lower the nozzle.

All cleaners of the supported nozzle type should have adjustable nozzle controls. The non-adjustable nozzles operate satisfactorily and efficiently on a carpet with a pile height suited to that particular cleaner; when, however, the cleaner is used on a rug whose pile is shorter or longer, cleaning effectiveness is lowered because of improper seal. Rug wear due to the use of the cleaner usually depends upon the relation of the nozzle to the rug. If the nozzle is too close to the rug, greater wear results.

Concerning rug wear Roberts states: "Some cleaners seem to remove larger percentages of nap compared to total dirt removed than others, irrespective of type of cleaner. But on the whole, there is not a great difference between the average results for four suction cleaners and five suction with motor-driven brush cleaners."[1] If the cleaner is pushed back and forth over the edges or fringe of the rug, the rug edge will be drawn up into the nozzle farther than it should normally go and rug wear will result.

Rug wear seems to be related to the way in which the cleaner is adjusted and operated more than to any structural design of the cleaner. If the nozzle is adjusted too close to the rug there will be such a high degree of friction between nozzle, brush and rug that the nap of the rug may be worn to some extent.

How Easy Is the Cleaner to Push?

Weight.—The weight of vacuum cleaners depends on many factors such as size of motor, type of cleaner and materials used in construction. The average cleaner varies in weight from around 10 pounds to 20 pounds. The straight suction cleaner with the supported nozzle usually weighs less than motor-driven brush type cleaners. The mechanism part of cleaners with unsupported nozzles usually weighs between 12 and 15 pounds. This does not include the flexible and rigid tubing. "It is desirable to have as light a cleaner as is consistent with durability and effective cleaning."[1]

Wheels.—The cleaner should have balance and be easy to guide. The ease of guiding is usually determined by the position, and size and type of wheels, and can only be judged during actual use of the cleaner. Ball bearing wheels usually make the cleaner easier to push. Rubber-tired wheels reduce noise when the cleaner is used on bare floors.

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[1] Roberts, Evelyn H., "Vacuum Cleaning," Agricultural Experiment Station Bulletin 336, State College of Washington, 1936.

Are Optional Cleaner Accessories Worth the Money?

Whether or not to pay the additional price usually required to buy attachments for a vacuum cleaner depends upon the use to which one is able and willing to put them. Frequent use of cleaning attachments as a part of the cleaning routine for taking care of such things as draperies, mattresses, upholstery, small recesses and books, makes for a higher degree of cleanliness. If, however, the attachments are to be used but few times, the cost for them is not justifiable. If it is possible to buy attachments separately, it is desirable to buy only those which would be of practical use in the home of the purchaser.

Attachments that are stored with or near the cleaner, and in a basket or similar container that can be carried about easily, will be used much more frequently than if getting them out and putting them away is difficult. Tools should be easy to attach and remove from the cleaner.

In order to be most usable for cleaning in corners and under furniture, as well as at various higher levels, the dusting tools should be designed with curved and straight nozzle extensions. Swivel joints between the flexible and rigid tubing and between the rigid tubing and the nozzle make for ease in handling. If the metal parts of the attachment tubes that fasten onto the flexible tubing are made of several fairly short lengths, they will be easy to store, but care must be taken that connections fit tightly and do not come apart in use.

Small hand cleaners may be desirable for cleaning such furnishings as upholstery, stair treads, and mattresses. Because of the weight of a hand cleaner, one objection to its use is the tiring of the arms while cleaning draperies or chair backs, and during long periods of use.

Additional articles other than dusting tools are made available by some manufacturers. The prospective purchaser should, before buying such equipment, consider carefully whether such articles might prove practical in use, or whether it would be better to buy a piece of equipment designed specifically for the job to be done. In buying a vacuum cleaner, relative importance of the use of the cleaner principally as a useful tool in itself should be compared carefully with its possible use for being the source of power for other tools.

To date, the vacuum cleaner is not effective as a means of moth-proofing furnishings except in its ability to help keep those furnishings clean. For more detailed information concerning this, read the bulletin, "Injurious Household Pests and Their Control."[1] The use of the cleaner for disinfecting is not considered to be effective.

Should Rebuilt Cleaners Be Considered?

Rebuilt vacuum cleaners usually cost about one-third the original cost of the cleaner. If properly rebuilt they generally give good service and are

[1] Parks, T. H., "Injurious Household Pests and Their Control," Bulletin 97, Agricultural College Extension Service, the Ohio State University, 1939.

worth the purchase price. Caution should be observed, however, in regard to the concern which does the rebuilding. It will be safer to purchase a cleaner which has been rebuilt by the original manufacturer. A fair guarantee should accompany such a purchase. "Factory rebuilt" cleaners may or may not mean the work was done by the original manufacturer. Many fly-by-night service organizations have been known to rebuild cleaners with poor and defective parts. The purchaser should not judge by appearance alone. The cleaner may be bright and new looking, but have old and possibly worn or poorly constructed parts.

Some of the inexpensive cleaners known as "off brand" appliances are made from die casts which have been used several years earlier by leading manufacturers. These die casts are very expensive and when one manufacturer changes models the dies have to be changed. Thus, to lower production costs due to model changes the manufacturer sells the die cast to another manufacturer and in this way it can be used a number of years in succession. Many times the "off-brand" cleaner is just as good as the cleaner made by the leading manufacturer a few years earlier.

What About Special Features?

Before final selection of a vacuum cleaner is made, the prospective purchaser should weigh the special features of each vacuum cleaner being considered. Some of the special features found on present models include cord reels and holders, automatic nozzle height adjustments, special dirt containers, various speeds, lights, and bag pressure indicators. Sometimes the addition of minor convenience features may add around $10 and $15 to the initial cost of the cleaner within the same brand.

A vacuum cleaner should be chosen on the basis of construction, convenience, and performance, rather than for any novelty in design or additional features which are not important to its efficiency, safety, and convenience of operation.

Is There a Book of Directions?

Suitable instructions should be furnished with the vacuum cleaner, fully explaining and giving specific directions for its operation and care.

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Care of the Vacuum Cleaner

The following points should be considered in taking care of the vacuum cleaner and in getting it ready for use:

What Parts Need Operator's Care?

Cleaning and Care of the Vacuum Cleaner Bag.—Empty the bag after each period of use. Dirt in the bag decreases the efficiency of the machine.

THE BAG IS NOT A STORAGE PLACE FOR DIRT! The air which does the work of pulling the dirt into the bag must escape through the meshes of the bag, and if the cleaner is to be efficient this air must be able to escape easily. Dust collected in the meshes of the bag prevents this.

While emptying the bag do not shake too vigorously nor hit it on sharp objects which are likely to cut the fabric. To keep the bag sufficiently clean, it is advisable to turn the bag inside out at least once a month and brush the cloth with a stiff bristle brush. Roberts states: "The cleanness of the inner surface of the vacuum cleaner bag is one of the most important factors for effective cleaning."[1]

Some manufacturers of vacuum cleaners state in their direction books that the vacuum cleaner bag should not be washed. If the fabric is treated by some process during manufacture, it may lose, if washed, some of the desirable and necessary characteristics which have made it dust proof.

Care of the Motor.—Follow the manufacturer's directions regarding cleaning and lubrication. Inefficient and costly operation of the cleaner is often due to improper care and lubrication of the motor. Give special attention to the following:

When to lubricate; where to lubricate; how to lubricate; and what kind of lubricant to use (the use of just *any* lubricant is not a wise practice); and how much lubricant to use (if too much lubricant is used it will probably run out or be thrown on parts of the motor which should be free from oil).

If there is a squeak or unusual noise, or if the motor "sparks," the appliance should be examined and repaired by a competent service man who knows this particular cleaner.

Remove dust from the motor and from the fan chamber by taking off the bag and turning the motor on. Allow to run for a few minutes. It would be best to put the cleaner outdoors when this is being done.

Care of the Brush Roll.—Threads and hair which may be wound around the roll should be removed at least once every week or at the time of cleaning the bag. It is best to remove the roll from the nozzle so that threads and hair which may be wrapped around the bearings at the ends of the roll can be found and removed. Cut them with scissors and remove. Oil the part in which the brush roll rests if and when necessary.

Care of the Cord.—When disconnecting the cleaner cord from the convenience outlet, grasp the outlet plug rather than the cord. Never pull on the cord.

Wrap the cord loosely around the hooks provided for this purpose on the cleaner. If the cord is pulled tightly around the hooks, the wires in the cord may be broken and the insulation may be damaged. Cords which reel should not be allowed to snap back. Avoid kinking, twisting, or straining the cord. Do not step on cord or push cleaner over cord.

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[1] Roberts, Evelyn H., "Vacuum Cleaning," Agricultural Experiment Station Bulletin 336, State College of Washington, 1936.

Use of the Vacuum Cleaner

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What Adjustments Make for Effective Cleaning?

Adjustment of Nozzle Height.—The straight suction type of cleaner depends almost entirely upon suction for cleaning. The nozzle lips must form as near a perfect seal with the rug as possible. For this reason, it is important to see that the nozzle is in correct adjustment at all times. This adjustment varies with different types of rugs. Follow the manufacturer's directions in regard to making these adjustments. In order to clean satisfactorily, it is sometimes necessary to exert a little pressure on the rigid tubing of an electric cleaner of the type which has an unsupported nozzle. This helps in reaching the dirt farther down in the rug pile by forming a better nozzle seal and also by developing greater friction between the nozzle lips and rug.

Motor-driven brush and agitator types of vacuum cleaners depend for cleaning ability upon sweeping and agitation of the rug in addition to suction. The sweeping action is accomplished by bristle brushes which are placed on a revolving roll located in the nozzle. The beating or agitating action is accomplished by the rapidly revolving bristle brushes. It is important that the bristles are in correct relationship to the particular rug being cleaned. Follow the manufacturer's directions in regard to securing the correct nozzle height adjustments. The adjustment is usually correct when the suction lifts the rug off the floor so that the nozzle seal can be formed.

On motor-driven brush type cleaners the nozzle may be adjusted in the following way: Raise the nozzle (using the nozzle adjustment control device) as high as it will go. Then let it down until a change in the sound of the motor is noticed. Whenever making nozzle height adjustments the handle should always be in the normal operating position.

Adjustment of the Brush Roll.—Adjustment should be made when necessary, as the bristles become increasingly worn. Some adjustment of the brush roll is usually provided for by the manufacturer in the construction of the brush roll. If it is possible, new brushes should be substituted for old worn brushes when all adjustments as to bristle heights have been made. In some cleaners, this replacement can be done without the necessity of calling a service man.

Belt Adjustment on Motor-driven Brush Types.—Be sure that the belt is in place before starting to use a motor-driven brush type cleaner, and is sufficiently tight so that it will not slip. If the belt is loose, the cleaner will be inefficient and hard to push. It is best to follow manufacturer's directions for belt replacement. Usually unless the belt is put over the motor shaft in the correct direction it will come off the motor pulley when the motor starts. It is always wise to check to see if the belt is functioning properly before the cleaner is used.

Speed of Operation.—The cleaner should be pushed or pulled about 2 to 4 feet per second. If it is operated any faster, cleaning effectiveness is low-

ered and time and energy are wasted. All straight suction cleaners of the supported nozzle type should be operated more slowly than the motor-driven brush types. The straight suction cleaner with unsupported nozzle seems to remove dirt more efficiently if the nozzle is pushed or pulled over the rug with very short quick strokes. When using any cleaner, it will be a saving of time if the operator cleans one small area of the rug thoroughly before going on to another area. Roberts found that "more dirt is removed during the first part of a cleaning period than during later periods."[1]

Time for Thorough Cleaning of a 9- by 12-foot Rug.—The time necessary for satisfactory cleaning of a rug with a *straight* suction cleaner is longer than with the use of the other type of vacuum cleaners. Thorough cleaning of a rug means not only the removal of surface dirt and litter, but the removal of embedded dirt as well. Therefore, if a straight suction cleaner is used, "a satisfactory minimum cleaning time for a 9- by 12-foot rug should be more than 20 minutes and possibly 30 to 40 minutes."[1]

"The time necessary for thorough cleaning of a 9- by 12-foot rug with the use of a motor-driven brush cleaner should be not less than 20 minutes. This removes approximately 84 per cent of the acquired dirt."

What About Special Cleaning Jobs?

Cleaning Small Rugs, Fringe, Rug Edges.—When cleaning small rugs, rug fringe, or rug edges lower the handle slightly on the return stroke. This breaks the nozzle seal and keeps the rug from being lifted up and also keeps the fringe or rug edge from being worn by the nozzle or being caught by the revolving brush. When the handle is lowered slightly on a cleaner with either a partially or wholly supported nozzle it is usually in the tilting position. With the handle in this position the nozzle also can be tilted up over the edge of the rug when the cleaner is being pushed from one rug to another or over bare floors.

When cleaning the edge of carpets do not allow any more of the nozzle than is absolutely necessary to extend over the edge of the rug. If as much as one-fourth of the nozzle extends over the edge of the rug the air follows the path of least resistance and rushes in through the one-fourth of the nozzle that is off the rug. The air, therefore, does not come up through the rug pile and the edges of the rug are left uncleaned.

Cleaning Stair Carpets.—To clean stair carpets with cleaners of the supported nozzle type the handle is locked in the horizontal position. This is usually done by engaging the tilt latch in the notch provided for this purpose. The cleaner can then be held parallel with the stair treads and the nozzle pushed back and forth over the carpet.

In order to clean the risers, hold the handle vertically and move the cleaner nozzle up and down against the carpet on the stair riser.

Use of Attachments.—Be sure that all connections are tight or else suction will be lowered.

[1] Roberts, Evelyn H., "Vacuum Cleaning," Agricultural Experiment Station Bulletin 336, State College of Washington, 1936.